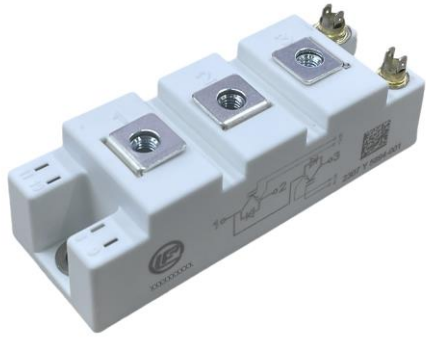


Description

The DFI150HF12DE1 offer ultrafast switching speed for high frequency application.



Features

- 1200V150 A, $V_{CE(sat)}(typ.) = 2.30V$
- Lower losses
- SPT (Soft Punch Through) technology
- Excellent short-circuit capability
- 34mm half bridge module

Applications

- Welding
- Motor drive
- Inductive heating
- Power supply
- UPS / EPS

Circuit diagram

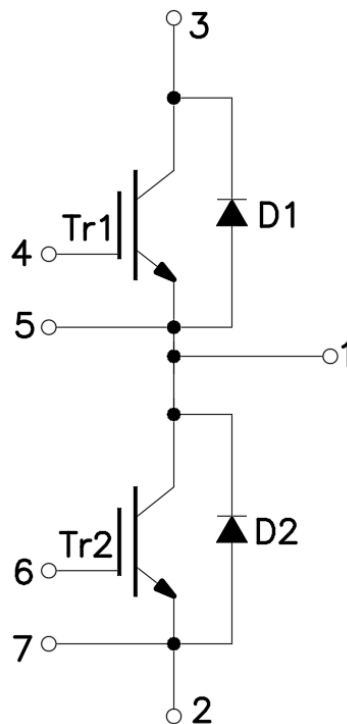


Figure 1. Out drawing & circuit diagram for DFI150HF12DE1

Pin Configuration and Marking Information

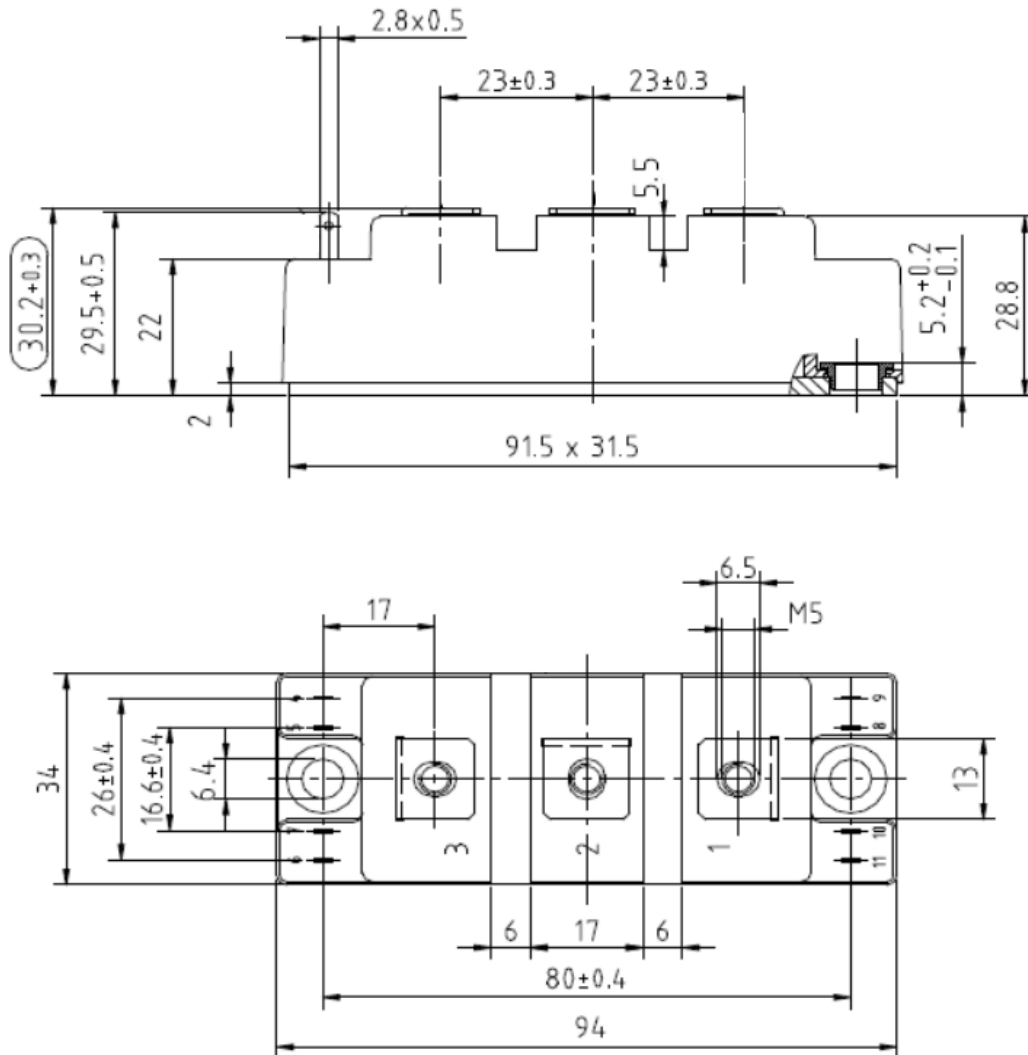


Figure 2. Pin configuration

Module

Parameter	Conditions	Value	Unit
Isolation Voltage	RMS, f = 50Hz, t = 1 min	2.5	KV
Material of module baseplate	-	Cu	-
Creepage distance	terminal to heatsink terminal to terminal	26 21	mm
Clearance	terminal to heatsink terminal to terminal	23.6 10	mm
CTI	-	>200	-
Module lead resistance, terminals – chip	T _c = 25°C	0.8	mΩ
Mounting torque for module mounting	M5, M6	3 to 6	Nm
Weight	-	160	g

Maximum Ratings (IGBT, $T_j=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-Emitter Voltage	G-E Short	1200	V
V_{GES}	Gate-Emitter Voltage	C-E Short	$\pm 30\text{V}$	V
I_C	DC Continuous Collector Current	$T_C=100^\circ\text{C}$	150	A
I_{CM}	Pulse Collector Current	$t_p=1\text{ms}$, Note1	300	A
P_C	Maximum Power Dissipation	$T_C=25^\circ\text{C}$, $T_j=150^\circ\text{C}$ (IGBT)	500	W
T_{jop}	junction temperature	-	-40 to 150	$^\circ\text{C}$
T_{stg}	Storage temperature	-	-40 to 125	$^\circ\text{C}$

Note1: Pulse width limited by maximum junction temperature

Maximum Ratings (Freewheeling diode, $T_j=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{RRM}	Peak Repetitive Revers Voltage	-	1200	V
I_F	Diode forward Current	- $T_C=100^\circ\text{C}$	150	A
I_{FRM}	Repetitive peak forward Current	$t_p=1\text{ms}$, Note1	300	A
T_{jop}	junction temperature	-	-40 to 150	$^\circ\text{C}$
T_{stg}	Storage temperature	-	-40 to 125	$^\circ\text{C}$

Note1: Pulse width limited by maximum junction temperature

IGBT Electrical characteristics ($T_j=25^\circ\text{C}$ unless otherwise specified, chip)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=150\text{A}$ $V_{GE}=15\text{V}$	$T_j=25^\circ\text{C}$	-	2.30	2.50	V
			$T_j=125^\circ\text{C}$	-	2.70	-	V
$V_{GE(th)}$	Gate-Emitter threshold Voltage	$I_C=1\text{mA}$, $V_{CE}=V_{GE}$		4.5	-	5.7	V
Q_G	Gate charge	$V_{GE} = -15\text{V to } +15\text{V}$		-	1140	-	nC
R_{Gint}	Internal gate resistor	$f=1\text{M}$, $V_{pp}=1\text{V}$	$T_j=25^\circ\text{C}$	-	2.5	-	Ω
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$ $f=1\text{MHz}$	$T_j=25^\circ\text{C}$	-	10.8	-	nF
C_{oes}	Output Capacitance			-	1.65	-	nF
C_{res}	Reverse transfer Capacitance			-	0.94	-	nF
I_{CES}	Collector- Emitter Cut off Current	$V_{CE}=1200\text{V}$, $V_{GE}=0\text{V}$	$T_j=25^\circ\text{C}$	-	-	1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE} = \pm 30\text{V}$, $V_{CE}=0\text{V}$	$T_j=25^\circ\text{C}$	-	-	200	nA
$t_{d(on)}$	Turn-on delay time	$V_{CC} = 600\text{V}$ $I_C = 150\text{A}$ $R_G = 4.7\Omega$ $V_{GE} = \pm 15\text{V}$ Inductive Load	$T_j=25^\circ\text{C}$	-	35	-	ns
			$T_j=125^\circ\text{C}$	-	40	-	
t_r	Rise time		$T_j=25^\circ\text{C}$	-	55	-	ns
			$T_j=125^\circ\text{C}$	-	60	-	
$t_{d(off)}$	Turn-off delay time	$T_j=25^\circ\text{C}$	-	340	-	ns	
		$T_j=125^\circ\text{C}$	-	370	-		

t_f	Fall time	$V_{CC} = 600V$ $I_C = 150A$	$T_j = 25^\circ C$	-	90	-	ns
			$T_j = 125^\circ C$	-	120	-	
E_{on}	Turn-on power dissipation	$R_G = 4.7\Omega$ $V_{GE} = \pm 15V$	$T_j = 25^\circ C$	-	6.30	-	mJ
			$T_j = 125^\circ C$	-	8.00	-	
E_{off}	Turn-off power dissipation	Inductive Load	$T_j = 25^\circ C$	-	4.10	-	mJ
			$T_j = 125^\circ C$	-	7.20	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT)		-	-	0.25	-	$^\circ C/W$

Freewheeling Diode Electrical characteristics ($T_j = 25^\circ C$ unless otherwise specified, chip)

Symbol	Item	Condition	Value			Unit	
			Min.	Typ.	Max		
V_F	Diode Forward Voltage	$I_F = 150A, V_{GE} = 0V$	$T_j = 25^\circ C$	-	1.90	2.2	V
			$T_j = 125^\circ C$	-	1.90	-	
t_{rr}	Diode Reverse Recovery Time		$T_j = 25^\circ C$		150		nS
			$T_j = 125^\circ C$		200		
I_{rr}	Peak reverse recovery Current	$I_F = 150A,$ $di/dt = 2600A/\mu s,$	$T_j = 25^\circ C$	-	165	-	A
			$T_j = 125^\circ C$	-	190	-	
Q_{rr}	Recovered charge	$V_R = 600V,$ $V_{GE} = -15V$	$T_j = 25^\circ C$	-	14.50	-	uC
			$T_j = 125^\circ C$	-	21.00	-	
E_{rr}	Reverse recovered energy		$T_j = 25^\circ C$	-	4.5	-	mJ
			$T_j = 125^\circ C$	-	7.3	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (Diode)		-	-	0.38	-	$^\circ C/W$

Test Conditions



Figure 3. Switching time measure circuit

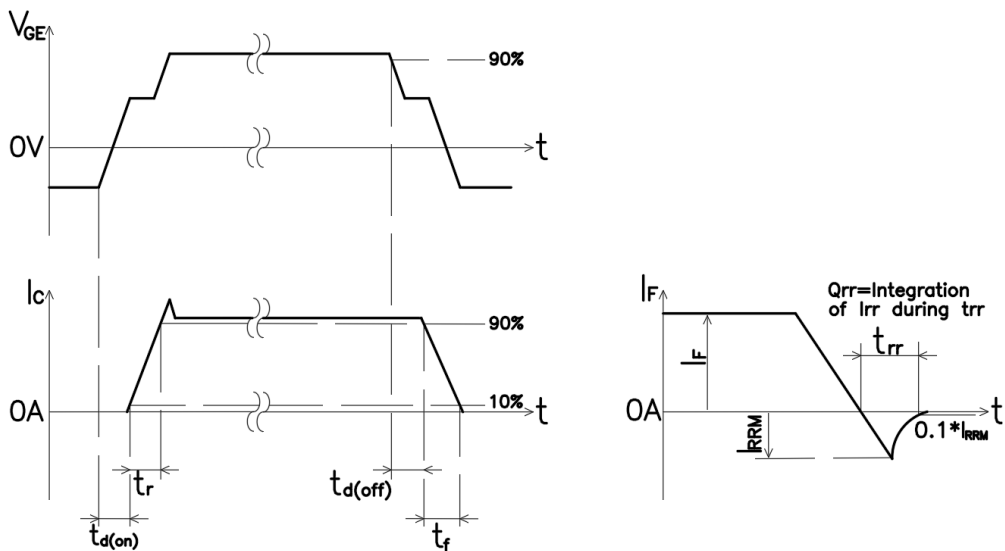


Figure 4. Switching time definition

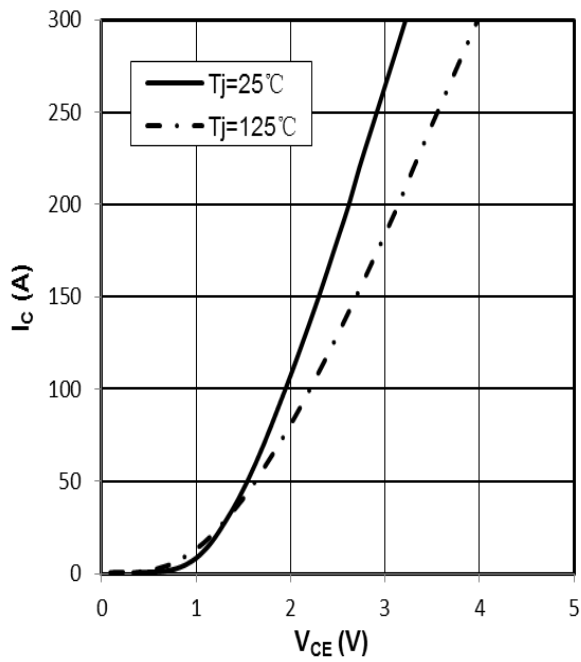


Figure 5. I_c vs V_{CE}
 $V_{GE}=15V$

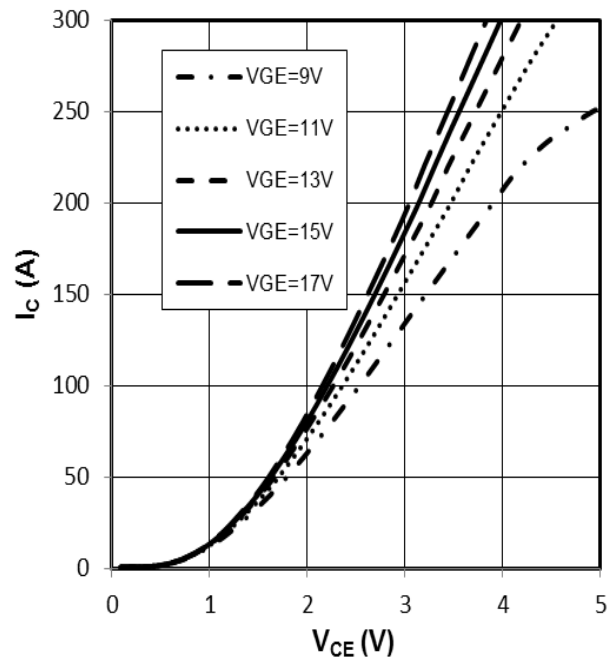


Figure 6. I_c vs V_{CE}
 $T_j=125^\circ C$

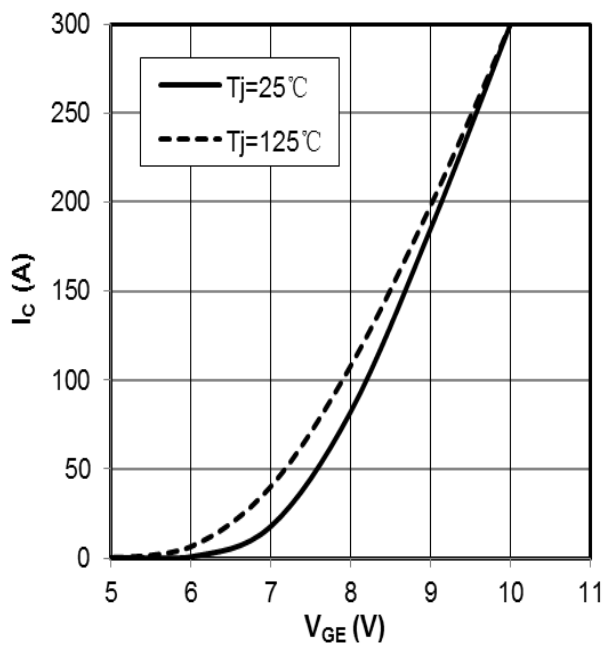


Figure 7. I_c vs V_{GE}
 $V_{CE}=20V$

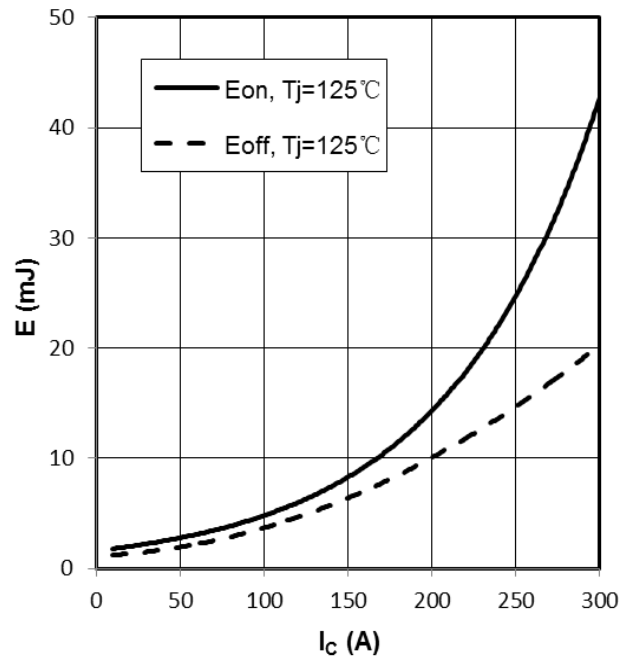


Figure 8. E_{on}, E_{off} vs I_c (Typ)
 $V_{CC}=600V, V_{GE}=+15V/-15V, R_G=4.7\Omega$

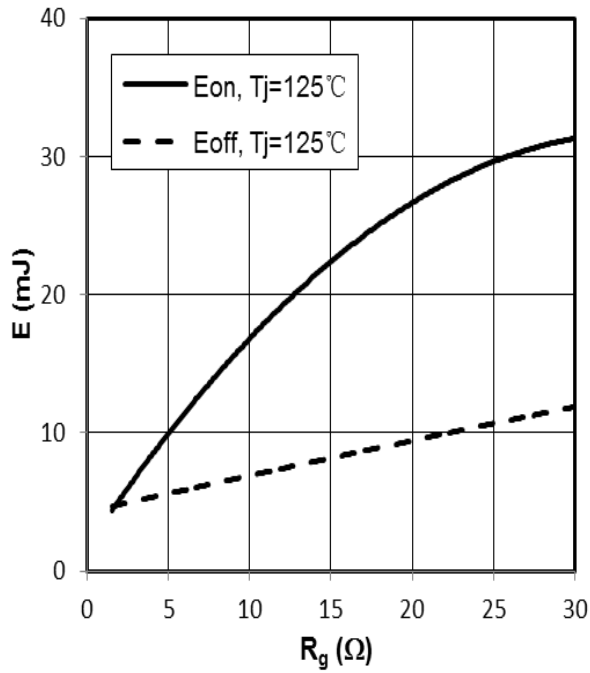


Figure 9. E_{on} , E_{off} vs R_g (Typ)
 $V_{CC}=600\text{V}$, $V_{GE}=\pm 15\text{V}/-15\text{V}$, $I_C=150\text{A}$

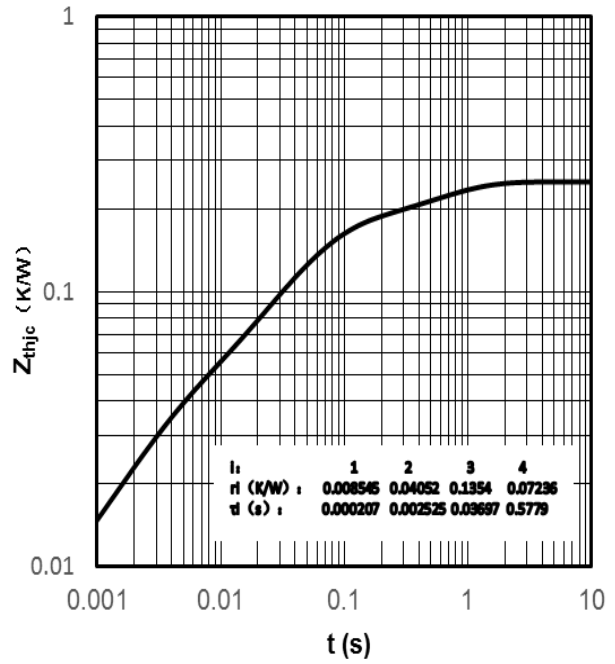


Figure 10. Transient thermal impedance IGBT, $Z_{thjc}=f(t)$

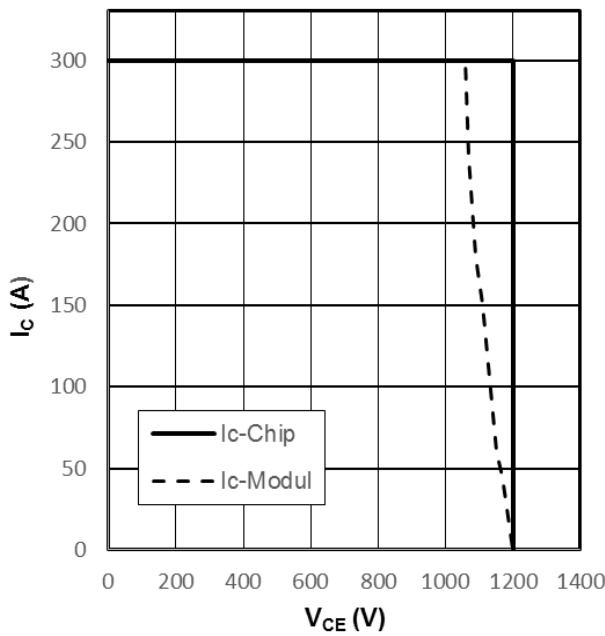


Figure 11. Reverse bias safe operating area IGBT,
 $I_C=f(V_{CE})$, $V_{GE}=\pm 15\text{V}$, $R_{Goff}=4.7\Omega$, $T_{vj}=125^\circ\text{C}$

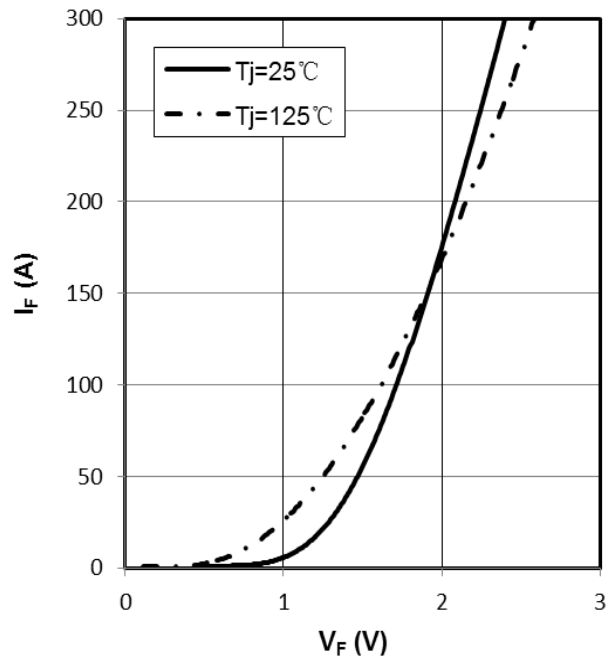
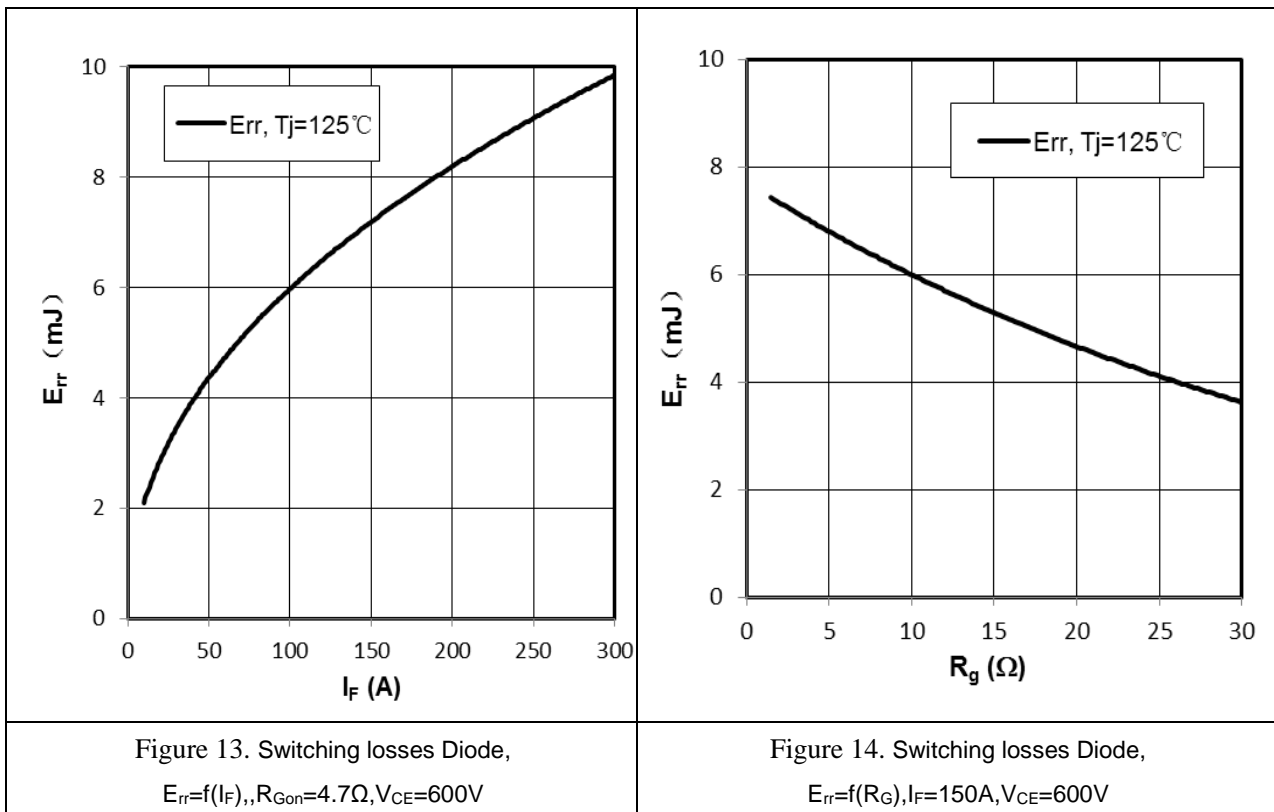


Figure 12. Forward characteristic of Diode,
 $I_F=f(V_F)$



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